

Hitachi Virtual Storage Platform Hitachi Volume Shredder User Guide

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Preface

This document describes and provides instructions for performing volume shredding operations on the Hitachi Virtual Storage Platform (VSP) storage system using the Hitachi Volume Shredder software on Storage Navigator.

Please read this document carefully to understand how to use this product, and maintain a copy for reference purposes.

This preface includes the following information:

- ☐ [Intended audience](#)
- ☐ [Product version](#)
- ☐ [Document revision level](#)
- ☐ [Source document\(s\) for this revision](#)
- ☐ [Changes in this revision](#)
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Intended audience

This document is intended for system administrators, Hitachi Data Systems representatives, and authorized service providers who are involved in installing, configuring, and operating the Hitachi Virtual Storage Platform storage system.

Readers of this document should meet the following requirements:

- You should have a background in data processing and understand RAID storage systems and their basic functions.
- You should be familiar with the Hitachi Virtual Storage Platform storage system, and you should have read the *Hitachi Virtual Storage Platform User and Reference Guide*.
- You should be familiar with the Storage Navigator software for Hitachi Virtual Storage Platform, and you should have read the *Storage Navigator User Guide*.

Product version

This document revision applies to Hitachi VSP microcode 70-01-0x or later.

Document revision level

Revision	Date	Description
MK-90RD7035-00	October 2010	Initial release

Source document(s) for this revision

- Not applicable.

Changes in this revision

- Not applicable.

Referenced documents

Hitachi Virtual Storage Platform:

- *Storage Navigator User Guide*, MK-90RD7027
- *Storage Navigator Messages*, MK-90RD7028
- *User and Reference Guide*, MK-90RD7042

Document organization

The following table provides an overview of the contents and organization of this document. Click the chapter title in the left column to go to that chapter. The first page of each chapter provides links to the sections in that chapter.

Chapter	Description
Chapter 1, Introduction to Volume Shredder	Provides an overview of Volume Shredder software features and functions.
Chapter 2, Shredding volumes	Provides instructions for shredding volumes.
Chapter 3, Troubleshooting	Provides troubleshooting information for using Volume Shredder.
Appendix A, Volume Shredder GUI reference	Describes the Storage Navigator windows and dialog boxes for Volume Shredder.

Document conventions

The terms “Virtual Storage Platform” and “VSP” refer to the Hitachi Virtual Storage Platform storage system, unless otherwise noted.

This document uses the following typographic conventions:

Convention	Description
Bold	Indicates text on a window or dialog box, including window and dialog box names, menus, menu options, buttons, fields, and labels. Example: Click OK .
<i>Italic</i>	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: copy <i>source-file</i> <i>target-file</i> Note: Angled brackets (< >) are also used to indicate variables.
screen/code	Indicates text that is displayed on screen or entered by the user. Example: # pairdisplay -g oradb
< > angled brackets	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: # pairdisplay -g <group> Note: Italic font is also used to indicate variables.
[] square brackets	Indicates optional values. Example: [a b] indicates that you can choose a, b, or nothing.
{ } braces	Indicates required or expected values. Example: { a b } indicates that you must choose either a or b.
vertical bar	Indicates that you have a choice between two or more options or arguments. Examples: [a b] indicates that you can choose a, b, or nothing. { a b } indicates that you must choose either a or b.
Underline	Indicates the default value. Example: [a b]

This document uses the following icons to draw attention to information:

Icon	Meaning	Description
	Tip	Provides helpful information, guidelines, or suggestions for performing tasks more effectively.

Icon	Meaning	Description
	Note	Calls attention to important and/or additional information.
	Caution	Warns the user of adverse conditions and/or consequences (e.g., disruptive operations).
	WARNING	Warns the user of severe conditions and/or consequences (e.g., destructive operations).

Convention for storage capacity values

Physical storage capacity values (e.g., disk drive capacity) are calculated based on the following values:

Physical capacity unit	Value
1 KB	1,000 bytes
1 MB	1,000 ² bytes
1 GB	1,000 ³ bytes
1 TB	1,000 ⁴ bytes
1 PB	1,000 ⁵ bytes
1 EB	1,000 ⁶ bytes

Logical storage capacity values (e.g., logical device capacity) are calculated based on the following values:

Logical capacity unit	Value
1 KB	1,024 bytes
1 MB	1,024 KB or 1,024 ² bytes
1 GB	1,024 MB or 1,024 ³ bytes
1 TB	1,024 GB or 1,024 ⁴ bytes
1 PB	1,024 TB or 1,024 ⁵ bytes
1 EB	1,024 PB or 1,024 ⁶ bytes
1 block	512 bytes

Accessing product documentation

The Hitachi Virtual Storage Platform user documentation is available on the Hitachi Data Systems Support Portal: <https://hdssupport.hds.com>. Please check this site for the most current documentation, including important updates that may have been made after the release of the product.

Getting help

The Hitachi Data Systems customer support staff is available 24 hours a day, seven days a week. If you need technical support, log on to the Hitachi Data Systems Support Portal for contact information: <https://hdssupport.hds.com>

Comments

Please send us your comments on this document: doc.comments@hds.com. Include the document title, number, and revision. Please refer to specific section(s) and paragraph(s) whenever possible.

Thank you! (All comments become the property of Hitachi Data Systems.)

Introduction to Volume Shredder

Storage Navigator uses the Volume Shredder function to shred data on the Hitachi Virtual Storage Platform storage system on both open and mainframe volumes. Volume shredding deletes data in volumes and prevents the deleted data from being restored. When the user of a volume is to be changed, the data stored by the previous user should be deleted for security reasons. The Volume Shredder function deletes all data in the volume completely in accordance with DoD5220.22-M (the standard defined by the U.S. Department of Defense).

- ☐ [Volume shredding functions](#)
- ☐ [Example of volume shredding](#)
- ☐ [System requirements](#)

Volume shredding functions

The term *volume shredding* refers to the process of deleting all user data in a volume by overwriting the data with dummy data. The volume shredding function is performed from Storage Navigator using the Hitachi Volume Shredder software. An example of executing the shredding function from Storage Navigator is depicted in [Example of volume shredding on page 1-3](#).

When you shred a volume, all user data in a volume is overwritten with dummy data. However, because of the nature of hard disks, one overwrite may not be enough to ensure that user data is completely deleted, and it is possible that some deleted user data could be restored. Therefore, best practice is to overwrite a volume at least three times using dummy data. The default setting of Volume Shredder defines overwriting three times using dummy data. You can change the default setting to overwrite the volume up to eight times. For details on Volume Shredder settings, see [Defining shredding settings on page 2-3](#).

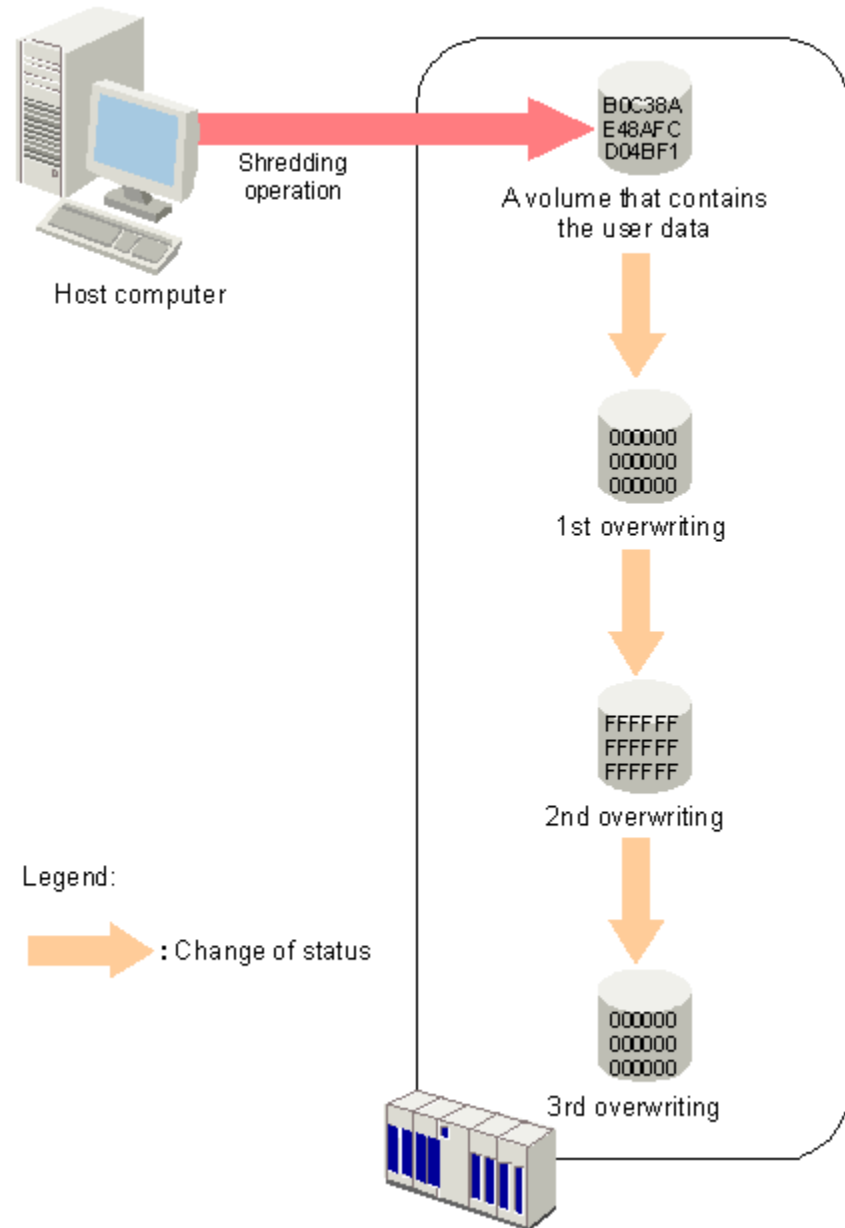
You can use the shredding function on all volume types (e.g., LDEV or CV) and emulation types, but the status of the volumes must be **Blocked**. If the status of a volume is **Normal**, the volume cannot be the target of the shredding function. For details on how to change the status of the volume to **Blocked**, see [Blocking a volume on page 2-2](#). You can select the target volumes of the shredding function in the Shred LDEVs window.

You cannot perform shredding on the following volumes:

- Pool volumes
- Copy-on-Write Snapshot virtual volumes
- Journal volumes
- Volumes whose access attribute is not read/write

For details on how to execute the shredding function, see [Shredding a volume on page 2-4](#).

Example of volume shredding



System requirements

The system requirements for using Volume Shredder are:

- Hitachi Virtual Storage Platform storage system
- Hitachi Storage Navigator software
- Hitachi Volume Shredder software. This software is for both OPEN and mainframe systems.

Shredding volumes

The following topics provide instructions for shredding volumes.

- ☐ [Volume shredding workflow](#)
- ☐ [Blocking a volume](#)
- ☐ [Calculating shredding passes for a flash disk](#)
- ☐ [Defining shredding settings](#)
- ☐ [Shredding a volume](#)
- ☐ [Stopping volume shredding](#)
- ☐ [Checking results of volume shredding](#)

Volume shredding workflow

- [Blocking a volume on page 2-2](#)
- [Calculating shredding passes for a flash disk on page 2-2](#)
- [Defining shredding settings on page 2-3](#)
- [Shredding a volume on page 2-4](#)
- [Stopping volume shredding on page 2-5](#)
- [Checking results of volume shredding on page 2-6](#)

Blocking a volume

The volume to be shredded must be in blocked status before the shredding begins. When a volume is blocked, I/O operations cannot be performed on the volume.

To block a volume:

1. Display the Storage Navigator main window.
2. Select **Storage System** in **Explorer**.
3. Select the resource under the **Storage System** folder.
 - The **LDEVs** tab is available when a parity group is selected in **Parity Group**.
 - The **LDEVs** tab is available when an LDEV is selected in **Logical Device**.
4. Find the volume to be blocked and check the status of the volume in the **Status** column.
 - If **Block** appears, the volume is already blocked.
 - If a status other than **Block** appears, the volume is not blocked. Continue to the next step.
5. Select the volume and click **Block LDEVs**.
6. When the confirmation message is displayed, click **Apply** to block the selected volume.

Calculating shredding passes for a flash disk

Because of the way space is allocated in a flash disk, you must overwrite data with dummy data that exceeds the capacity of the target volume. Therefore, before shredding a flash disk volume, calculate the number of shredding operations that are required in order to overwrite data in the target volume with dummy data.

To calculate the number of shredding passes required for a flash disk:

1. Confirm the capacity of target volume for data deleting and the number of data making up RAID configuration on the **LDEVs** tab is displayed when an LDEV in **Logical Device** is selected.

Example: Confirmation of the number of data making up RAID configuration

n of RAID5($n \times D + 1P$)

n of RAID6($n \times D + 2P$)

2. Where the number of shredding operations necessary to overwrite data in the target volume with dummy data is N, calculate using the following formula.

$$N \text{ (Rounding up after the decimal point)} = (\text{Capacity-of-target-volume} + \text{User-capacity-for-Data}^{*1}) / \text{Capacity-of-target-volume}$$

*1: User capacity for data: Examples are shown as follows.

When the capacity of flash disk is 200 GB, $200 \text{ GB} \times n$

When the capacity of flash disk is 400 GB, $400 \text{ GB} \times n$

Example of calculating the number of required shredding operations:

Sample configuration: Flash disk is 200 GB, RAID configuration is 3D+1P, and LDEV is 220 GB

$$[(200 \times 3) + 220] / 220 = 3.73$$

When the above value is rounded up after the decimal point, the dummy data writing needs to be performed four times.

Delete data conforming to DoD5220.22-M (overwrite with dummy data three times)

Sample configuration: Flash disk is 200 GB, RAID configuration is 3D+1P, and LDEV is 220 GB

1. Calculate the number of shredding operations.

$$[(200 \times 3) + 220] / 220 = 3.73$$

When the above value is rounded up after the decimal point, the dummy data writing needs to be performed four times.

2. Define the shredding settings (see [Defining shredding settings on page 2-3](#)).

Enter dummy data **00** in the text box and add a row to the **Data Pattern(User Setting)** list (add rows for performing shredding operation four times).

3. Delete the data in the volume (see [Shredding a volume on page 2-4](#)).
4. Repeat steps 2 and 3 using dummy data **FF**.
5. Repeat steps 2 and 3 using dummy data **00**.

Defining shredding settings

The shredding settings include default and user-specified settings defined in the **Shredding Param.** window. The user-specified shredding settings are maintained while the **Shred LDEVs** window is displayed.

To define the shredding settings:

1. Display the Storage Navigator main window.

2. Select the resource to display the tab windows:
 - The **LDEVs** tab is displayed when a parity group in **Parity Group** is selected.
 - The **LDEVs** tab is displayed when an LDEV in **LDEVs** is selected.
3. Select the volume to be shredded and click **Shred LDEVs**.
The **Shred LDEVs** window is displayed.
4. Click **Edit Data Pattern**.
The **Edit Shredding Data Pattern** window is displayed.
5. To use the default value, select **Default Pattern (00-FF-00)**, and click **OK**. To specify the settings, select **User Setting** in ***Data Pattern** and continue to the next step.
6. To use the random data setting, select **Random Data**, and click **Add**. Random numbers are added in the **Data Pattern(User Setting)** table. Click **OK** to close the **Edit Shredding Data Pattern** window.
7. To specify the data pattern, select **Define Data**, and enter the following settings:
 - Enter a number that you want to use as dummy data in the text box, and click **Add**. You can enter a hexadecimal number up to four digits (0 to FFFF). The number is added in the **Data Pattern(User Setting)** table.

We recommend that you enter three or more numbers to use as dummy data. If you perform a shredding operation with one or two numbers, it is possible that all data may not be completely deleted from the volume.

To delete the numbers that you entered, click **Clear** and re-enter the desired numbers. If you click **Clear**, values other than **00** in the bottom row are deleted.
 - When you are finished entering the desired numbers, click **OK** to close the **Edit Shredding Data Pattern** window.

Shredding a volume

After ensuring the volumes are blocked, calculating shredding repetitions, and defining shredding settings, you are ready to start the shredding operation to delete data from the volume.

1. Display the Storage Navigator main window.
2. Select the resource to display the tab windows:
 - The **LDEVs** tab is displayed when a parity group in **Parity Group** is selected.
 - The **LDEVs** tab is displayed when an LDEV in **Logical device** is selected.
3. Check the volumes to make sure that they are in **Blocked** status.
If the volumes are not **Blocked**, change the status to **Blocked** (see [Blocking a volume on page 2-2](#)).
4. Select the volume to be shredded, and click **Shred LDEVs**.

The **Shred LDEVs** window is displayed.

5. To save the result of the volume shredding operation as the file, click **Set Data Output**. If not, click **Cancel Data Output**. Volumes that can be saved the result of the volume shredding operation are up to three.
6. Click **Finish** in the **Shred LDEV** window.

The confirmation window is displayed.

7. Click **Apply**.

The shredding operation starts. To stop the shredding operation, see [Stopping volume shredding on page 2-5](#).

When the shredding operation is finished, the status of the volume is automatically changed to **Normal**.

Stopping volume shredding



Caution: If you stop a shredding operation, you cannot restart the shredding operation, and the contents of the volume are not guaranteed.

To stop shredding a volume:

1. Display the Storage Navigator main window.
2. Select **Storage System** in **Explorer**.
3. Select the **Tasks**.

The list of task is displayed.

4. In the list, click the task name you want to stop the shredding.

The **Task Properties** dialog box is displayed.

5. Click **Abort** in the **Shredding Data pattern** field.

6. Verify the displayed settings and click **Yes**.The shredding operation is stopped.
7. Click **Close** in the **Task Properties** dialog box.

Status	Meaning
Writing.	The shredding operation is being performed.
Shredding operation not executed.	The shredding operation was not performed according to the specified parameters.
Shredding operation canceled.	The shredding operation was cancelled.
Shredding operation Failed.	The shredding operation was ended abnormally.
Shredding data transfer error.	The result of the shredding operation could not be output to a file.
Shredding data verify error.	An error was detected while verifying the file containing the result of the shredding operation.
No-data assigned.	When you execute a shredding operation on an unused Dynamic Provisioning virtual volume and open the file that contains the result of the shredding operation, this file will contain the text No-data assigned. In this case, no dummy data will be written to the unused Dynamic Provisioning virtual volume. However, if the following volumes are included in the target of a shredding operation, dummy data will be written to the following volumes: • Dynamic Provisioning virtual volumes that are being used • Internal volumes • External volumes

6. Click **Close** in the **Task Properties** dialog box.

On the downloaded file

In the **Selected LDEVs** table on the **Shred LDEVs** window, if the **Data Output** column is set to **YES**, the result of shredding a volume can be saved as files in the Storage Navigator computer. You can use this file to check the results of shredding a volume.

1. On the menu bar, select **Report > Shredding Report >** and **Download Latest Report** or **Download Other Reports**.

Select **Download Latest Report** to download the latest result file.
Select **Download Other Reports** to download the past ten times result files.

The message that the preparation for download is completed is displayed.

2. Click **OK**.
3. Specify the folder in which to download the file.
4. Click **Save**.

Compression files are downloaded. To decompress the compression file, you will obtain binary files containing the results of the shredding operation and text files containing contents and results of the shredding operation.

The name of the binary file indicates LDKC, CU, and LDEV numbers of the shredded volumes, and the number of times dummy data have been written to the volumes. For example, if a binary file is named 00-01 11 03.bin, the LDKC number is 00, the CU number is 01, and the LDEV number is 11. The filename also indicates that dummy data have been written to that volume three times. A binary file contains the first 512 bytes of data of a shredded volume (LDEV).

The file name of a text file is displayed as follows;

shred_the-finish-time-of-shredding-operation.txt

The compressed file is saved with the time zone setting of SVP. If the compressed file is decompressed on the Storage Navigator computer, the time stamp of the decompressed file is displayed with the time zone setting of the Storage Navigator computer. Therefore, the time stamp of the decompressed file might be different from the actual finish time of a shredding operation.

The text file contains the following summary information of a shredding operation:

- Results of a shredding operation
- Contents of the dummy data
- Shredded volumes
- Start and finish time of a shredding operation

Troubleshooting

This topic provides troubleshooting information for Volume Shredder.

- [□ Troubleshooting](#)
- [□ Calling the Hitachi Data Systems Support Center](#)

Troubleshooting

- For troubleshooting information about the Virtual Storage Platform storage system, see the *Hitachi Virtual Storage Platform User and Reference Guide*.
- For troubleshooting information about Storage Navigator, see the *Hitachi Storage Navigator User Guide*.
- For information about the Storage Navigator error messages, see the *Hitachi Storage Navigator Messages*.

Calling the Hitachi Data Systems Support Center

If you need to call the Hitachi Data Systems Support Center, please provide as much information about the problem as possible, including:

- The circumstances surrounding the error or failure.
- The content of any messages displayed on Storage Navigator.
- The Storage Navigator configuration information (use the FD Dump Tool).
- The service information messages (SIMs), including reference codes and severity levels, displayed by Storage Navigator.

The Hitachi Data Systems customer support staff is available 24 hours a day, seven days a week. If you need technical support, log on to the Hitachi Data Systems Support Portal for contact information: <https://hdssupport.hds.com>



Volume Shredder GUI reference

Storage Navigator provides windows and dialog boxes for shredding volumes.

- [□ Shred LDEVs wizard](#)
- [□ Edit Shredding Data Pattern window](#)

Shred LDEVs wizard

Shred LDEVs window

Use this window to select the LDEVs to be shredded.

Shred LDEVs

1. Shred LDEVs 2. Confirm

This wizard allows you to select data stored in the LDEVs. The data will be shredded using the default data patterns. Click Edit Data Pattern to edit the defaults. To toggle the Data Output feature on or off, use the Set Data Output and Cancel Data Output buttons. Click Finish to confirm.

Selected LDEVs

Filter: ON OFF Select All Pages Options: 1 / 1

LDEV ID	LDEV Name	Parity Group ID	Pool Name(ID)	Emulation Type	Capacity	Provisioning Type	Data Output
0000:00		P01-2	-	OPEN-V	0.04 GB	Basic	YES

Selected: 0 of 1

Set Data Output Cancel Data Output

Shredding Data pattern

Pattern Number	Data Pattern
1	00
2	FF
3	00

Edit Data Pattern

Selected LDEVs table

This table lists information about the LDEVs selected to be shredded.

Item	Description
LDEV ID	The ID of the LDEV selected for shredding. The ID is a combination of a logical disk controller (LDKC) number, a control unit (CU) number, and a logical device (LDEV) number. Free indicates free space.
LDEV Name	Name of the LDEV selected for shredding.
Parity Group ID	The parity group number (e.g., 1-1) of which the selected LDEV is a member. - A parity group number starting with E (e.g., E1-1) indicates that the parity group consists of one or more external volumes. - A parity group number starting with V (e.g., V1-1) indicates that the parity group consists of one or more Copy-on-Write Snapshot virtual volumes. - A parity group number starting with X (e.g., X1-1) indicates that the parity group consists of one or more Dynamic Provisioning virtual volumes.
Pool Name(ID)	Pool name, if the volume is a pool volume (pool-VOL). The pool ID is enclosed by parentheses.
Emulation Type	The emulation type of the LDEV selected for shredding.

Item	Description
Capacity	The capacity of the LDEV selected for shredding. Change the unit of capacity by selecting Option > Capacity Unit .
Provisioning Type	The provisioning type of the selected volume. • Basic: Internal volume. • External: External volume • DP: Virtual volume of Dynamic Provisioning.
Data Output	Indicates whether the results of the shredding operation will be saved in a file. Click Set Data Output to save the results. Results can be saved for up to three volumes. Yes: The result of the shredding operation will be saved. No: The result of the shredding operation is not saved.
Set Data Output	Click to set saving the result of the shredding operation.
Cancel Data Output	Click to cancel saving the result of the shredding operation.

Shredding Data Pattern table

This table lists the shredding data pattern and the number of passes that will be performed when the LDEVs are shredded.

Item	Description
Pass Number	Shows the order of overwritings.
Data Pattern	The dummy data that will overwrite data on the volume.
Edit Data Pattern	Opens the Edit Shredding Data Pattern dialog box, where you can change the shredding data pattern information shown in this list.

Confirm window

In this window, review the information about the LDEVs selected to be shredded, review the shredding data pattern to be used, type a unique name for this shredding task, and then click Apply to start shredding the volume.

Shred LDEVs

1. Shred LDEVs > 2. Confirm

⚠ All Data will be lost on the LDEVs. Are you sure to continue?

Task Name: (Max. 32 Characters)

Selected LDEVs							
LDEV ID	LDEV Name	Parity Group ID	Pool Name(ID)	Emulation Type	Capacity	Provisioning Type	Data Output
00:02:C0		1-2	-	OPEN-V	0.04 GB	Basic	YES
Total: 1							

Shredding Data pattern		
Pass Number	Data Pattern	Result
1	00	-
2	FF	-
3	00	-

☐ Go to tasks window for status Back Next Apply Cancel Help

Selected LDEVs table

This table lists information about the LDEVs selected for shredding.

Item	Description
LDEV ID	A combination of a logical disk controller (LDKC) number, a control unit (CU) number, and a logical device (LDEV) number. Free indicates free space.
LDEV Name	Displayed in alphanumeric characters of 32 characters or less. The characters are case-sensitive.
Parity Group ID	The parity group number (e.g., 1-1) of the LDEV. - A parity group number starting with E (e.g., E1-1) indicates that the parity group consists of one or more external volumes. - A parity group number starting with V (e.g., V1-1) indicates that the parity group consists of one or more Copy-on-Write Snapshot virtual volumes (V-VOLs). - A parity group number starting with X (e.g., X1-1) indicates that the parity group consists of one or more Dynamic Provisioning virtual volumes (V-VOLs).
Pool Name(ID)	Displayed if The volume is a pool volume (pool-VOL). The pool ID is enclosed by parentheses.
Emulation Type	Displays the emulation type of LDEVs.
Capacity	Displayed the capacity of the LDEV displayed in the unit selected by Option > Capacity Unit .
Provisioning Type	The provisioning types of LDEVs are: Basic: Internal volume. External: External volume DP: Virtual volume of Dynamic Provisioning.

Item	Description
Data Output	Indicates whether the results of the shredding operation will be saved in a file. Click Set Data Output to save the results. Results can be saved for up to three volumes. Yes: The result of the shredding operation will be saved. No: The result of the shredding operation is not saved.
Total	The total count of LDEVs.

Shredding Data Pattern table

This table lists the shredding data pattern and the number of passes that will be performed to shred the selected LDEVs.

Item	Description
Pass Number	Shows the order of overwritings.
Data Pattern	Shows the dummy data that will be used each time.
Result	Displays the results of the shredding operation. - The task is not performed. - Shredding operation Normal. The shredding operation was ended normally. - Writing. The shredding operation is being performed. - Shredding operation not executed. The shredding operation was not performed according to the specified parameters. - Shredding operation canceled. The shredding operation was cancelled. - Shredding operation Failed. The shredding operation was ended abnormally. - Shredding data transfer error. The result of the shredding operation could not be output to a file. - Shredding data verify error. An error was detected while verifying the file containing the result of the shredding operation. - No-data assigned. When you execute a shredding operation on an unused Dynamic Provisioning virtual volume and open the file that contains the result of the shredding operation, this file will contain the text No-data assigned. In this case, no dummy data will be written to the unused Dynamic Provisioning virtual volume. However, if the following volumes are included in the target of a shredding operation, dummy data will be written to the following volumes: - Dynamic Provisioning virtual volumes that are being used - Internal volumes - External volumes

Edit Shredding Data Pattern window

Use this window to define the settings of the shredding operation.

Item	Description
Data Pattern	Select whether you use the default settings of the shredding operation or you will define the settings of the shredding operation yourself. Default (00-FF-00): Deletes the data in a volume by overwriting the volume three times with dummy data. When the volume is overwritten for the first and the third times, the volume shredding uses "00" (hexadecimal number) for the dummy data. When the volume is overwritten for the second time, the volume shredding uses "FF" (hexadecimal number) for the dummy data. User: Enables you to define the dummy data and how many times you want to overwrite the volume.
Random Data	Volume shredding selects 4-digit hexadecimal numbers at random for the dummy data.
Define Data	You can enter hexadecimal numbers to be used as the dummy data. You can enter hexadecimal numbers from 0 to FFFF.
Add	Adds the user-defined dummy data defined to the list. This button is not available when you select Default in the Write Data Type field.

Data Pattern (User Setting)

Item	Description
Pass Number	Shows the order of overwritings.
Data Pattern	Shows the dummy data to be used each time.
Clear	Clears all values other than 00 in the bottom row in the Data Pattern(User Setting) table.
OK	Applies the settings to the storage system.
Cancel	Cancels the current operation.
Help	Displays the help topic.



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